Appendix C

Hydrology Report

Existing On-Site Storm Drain Analysis

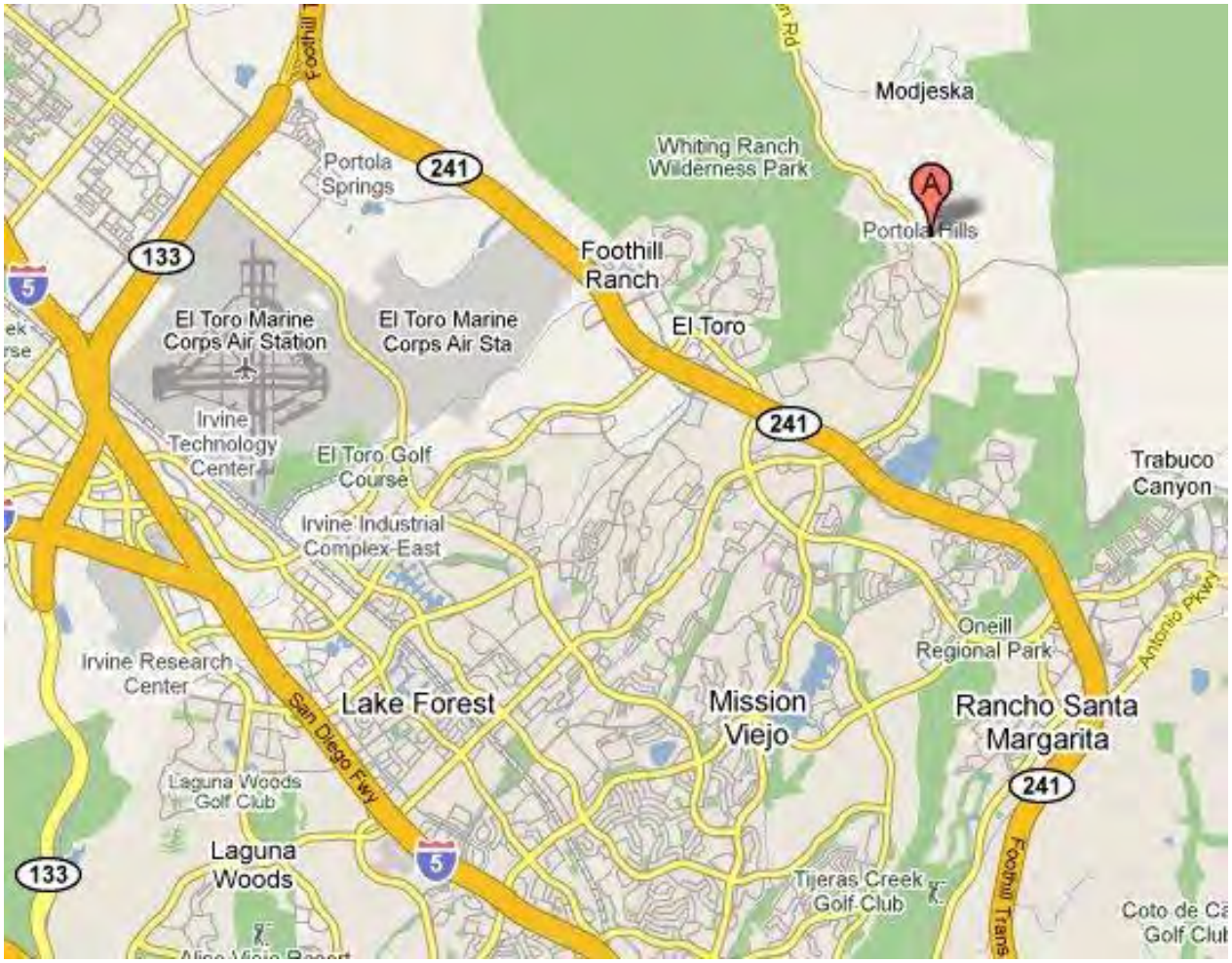
Rancho Las Lomas
19191 Lawrence Canyon
Orange County, California 92667

Prepared By:
Trithis Engineering
1524 Brookhollow Dr. – Suite C
Santa Ana, CA 92705
949-642-7442

February 22, 2012

Introduction:

The project, Rancho las Lomas (RLL), consisting of approximately 20 acres is located directly west of and adjacent to Santiago Canyon road about 1000 feet northerly of the junction of Santiago Canyon Road and Live Oak Canyon Road in Orange County, California. It is traversed from north to south by Santiago Canyon Road and by Alisos Creek, which meanders through the project as a natural drainage course in which several culverts and bridges have been constructed for road crossings. Also, an earth levee approximately 10 feet high and 750 feet long has been constructed between the east side of the natural drainage course and Santiago Canyon Road.



VICINITY MAP (SITE 'A')

The drainage area consists of 678.5 acres and varies from elevation 2200 at the north end and to elevation 1111 at the south end as shown on the El Toro and Santiago Peak U.S.G.S. Quadrangle Maps. At present, the drainage area has undergone residential development to the east modifying its natural state, which consisted of chaparral, open brush, and some live oak trees. This new development has modified the flow characteristics to 2 drainage structures crossing Santiago Canyon Road from the east and discharging into Alisos Creek, which flows north to south through RLL.

The purpose and intent of this report is to analyze the existing onsite drainage collection system to provide operational characteristics in 10 and 100 year storm events. All onsite drainage flows directly to Alisos Creek either by sheet/surface flow or by the onsite storm drain collection system which then discharges into Alisos Creek through drain line which daylights onto rip rap energy dissipaters roughly 10'x10' in area, minimum 6" Class 2 Rock with no grout.

SITE AERIAL PHOTO

We have analyzed each drainage collection zone for Q10 and Q100 storm events. Rainfall data has been obtained the Orange County Hydrology Manual Figure B-4 Mean Precipitation Intensities for Mountainous Area which follows. We have elected to use the simplified rational method to calculate the storm flows from each watershed as directed by the Orange County Hydrology Manual. We have submitted hydrology reports for this project in the past and that has proven to be an acceptable method of analysis for this existing project's storm collection and conveyance system.

Design Engineering:

The volume of runoff has been estimated using the formula known as the *Rational Method (Q=ACI) where 'Q' = flow in CFS, 'A' = area drained in acres, 'C' = coefficient of runoff and 'I' = intensity of rainfall in inches per hour.* The intensity (I) of rainfall used for these calculations is 1.25"/hr (10 year storm event) and 1.95"/hr (100 year storm event).

We have elected to use the Rational Method in its most basic form without including calculation for time of concentration (Tc), nor any adjustments due to infiltration. We have also used runoff coefficients which we consider very conservative and not incorporated "Area Averaged" calculations to raise or lower the coefficients to more liberal flow reductions. The calculations have been performed with the assumption that all systems are running at maximum flow for the given storm event.

The calculation sheet (PAGE 5) lists each drainage pipe installed at the site in the first column. Please use the included scale drawing of the site for Line and Area Reference. In addition the chart address's the following information:

1. Drainage area Runoff Coefficient
2. Rainfall for R Q10 – 10 year storm event
3. Rainfall for R Q100 – 100 year storm event
4. Drainage area collected in Acres
5. Flow for 10 year event (F Q10) in Cubic Feet per Second.
6. Flow for 100 year event (F Q100) in Cubic Feet per Second.
7. Slope of collector pipe in percent grade.
8. Type of pipe installed, PVC, RCP or CMP
9. Roughness Coefficient 'n' for installed pipe.
10. Size of pipe that would have been specified had this project be in the preliminary design phase of development.
11. Size of pipe as it is installed at the project site.
12. Maximum flow that the installed pipe will convey as it is currently installed at the project site.

ORANGE COUNTY PRECIPITATION DATA (inches)

	DURATION					
T-YR.	5M	30M	1H	3H	6H	24H
100	0.52(.78)	1.09(1.34)	1.45(1.94)	2.43(3.96)	3.36(6.19)	5.63(11.27)
50	0.45(.71)	0.98(1.19)	1.30(1.73)	2.19(3.52)	3.02(5.51)	5.07(10.02)
25	0.40(.63)	0.87(1.04)	1.15(1.51)	1.94(3.08)	2.71(4.81)	4.49(8.76)
10	0.34(.50)	0.72(.84)	0.95(1.22)	1.59(2.48)	2.20(3.87)	3.68(7.05)
5	0.26(.40)	0.59(.68)	0.78(.99)	1.31(2.01)	1.81(3.14)	3.03(5.71)
2	0.19(.26)	0.40(.45)	0.53(.66)	0.89(1.34)	1.22(2.09)	2.05(3.81)

NOTES:

(1.) Numbers in ( ) are from the Santiago Peak gage station #156 Use in areas above 2,000 feet in elevation.

(2.) Precipitation data for nonmountainous areas taken from an average of 25 rain gages. Use in areas below 2,000 feet in elevation.

(3.) All 5M values are extrapolations

(4.) M = minutes; H = hours.

Rancho Las Lomas On-Site Drainage System Analysis

Pipe #	Runoff 'C'	R Q10	R Q100	Acres	F Q10	F Q100	Slope %	Pipe	Roughness '*n*'	Design Size	Installed Size	Max Flow CFS
L1	0.95	1.25	1.95	0.99	**1.18**	**1.83**	13	PVC	0.009	**6"**	**12"**	23.00
L2	0.95	1.25	1.95	1.95	**2.32**	**3.61**	6	CMP	0.022	**10"**	**12"**	5.50
L3	0.95	1.25	1.95	0.79	**0.94**	**1.46**	20	RCP	0.012	**6"**	**12"**	17.00
L4	0.95	1.25	1.95	0.97	**1.15**	**1.80**	2	RCP	0.012	**8"**	**12"**	5.50
L5	0.20	1.25	1.95	4.57	**1.14**	**1.78**	2	RCP	0.012	**8"**	**12"**	6.00
L6	0.95	1.25	1.95	1.35	**1.60**	**2.50**	2	CMP	0.022	**10"**	**12"**	3.25
L7	**C1**	1.25	1.95	6.81	**3.90**	**6.08**	23	CMP	0.022	**10"**	**18"**	25.00
L8	0.95	1.25	1.95	1.22	**1.45**	**2.26**	21	PVC	0.009	**6"**	**12"**	20.00
L9	0.95	1.25	1.95	0.72	**0.86**	**1.33**	2	PVC	0.009	**6"**	**6"**	1.30
L10	0.95	1.25	1.95	0.42	**0.50**	**0.78**	42	PVC	0.009	**4"**	**6"**	4.00
L11	0.20	1.25	1.95	2.09	**0.52**	**0.82**	28	CMP	0.022	**4"**	**12"**	11.00
L12	0.95	1.25	1.95	3.41	**4.05**	**6.32**	21	CMP	0.022	**10"**	**12"**	6.00
L13	0.20	1.25	1.95	1.53	**0.38**	**0.60**	22	PVC	0.009	**4"**	**12"**	22.00
L14	0.95	1.25	1.95	0.16	**0.19**	**0.30**	2	PVC	0.009	**4"**	**6"**	1.30
L15	0.95	1.25	1.95	0.14	**0.17**	**0.26**	9	PVC	0.009	**4"**	**6"**	2.80
L16	0.35	1.25	1.95	0.32	**0.14**	**0.22**	6	RCP	0.012	**4"**	**18"**	31.00
L17	0.95	1.25	1.95	0.09	**0.11**	**0.17**	1	PVC	0.009	**4"**	**4"**	1.30
L18	0.95	1.25	1.95	0.28	**0.33**	**0.52**	6	RCP	0.012	**4"**	**18"**	22.50
L19	0.95	1.25	1.95	0.09	**0.11**	**0.17**	36	PVC	0.009	**4"**	**6"**	5.00
L20	0.95	1.25	1.95	0.20	**0.24**	**0.37**	36	PVC	0.009	**4"**	**6"**	5.00
L21	0.95	1.25	1.95	0.19	**0.23**	**0.35**	2	PVC	0.009	**4"**	**6"**	1.41
L22	0.95	1.25	1.95	0.19	**0.23**	**0.35**	2	PVC	0.009	**4"**	**6"**	1.41
L23	0.95	1.25	1.95	0.20	**0.06**	**0.37**	40	PVC	0.009	**4"**	**4"**	1.70
L24	0.95	1.25	1.95	0.14	**0.17**	**0.26**	15	PVC	0.009	**4"**	**4"**	1.20
L25	0.95	1.25	1.95	0.28	**0.33**	**0.52**	35	PVC	0.009	**4"**	**4"**	1.70
L26	**C2**	1.25	1.95	0.20	**0.24**	**0.37**	37	PVC	0.009	**4"**	**8"**	1.85
L27	0.95	1.25	1.95	0.17	**0.20**	**0.31**	43	PVC	0.009	**4"**	**6"**	1.80
L28	**C3**	1.25	1.95	1.33	**1.58**	**2.46**	43	PVC	0.009	**4"**	**8"**	7.75
L29	0.95	1.25	1.95	1.28	**0.06**	**2.37**	19	PVC	0.009	**4"**	**12"**	22.00
L30	0.95	1.25	1.95	0.82	**0.97**	**1.52**	37	PVC	0.009	**4"**	**12"**	26.00
L31	0.95	1.25	1.95	0.08	**0.10**	**0.15**	27	PVC	0.009	**4"**	**6"**	3.20

C1	Collector Pipe from L4, L5 and L6
C2	Collector Pipe from L15 and L24
C3	Collector Pipe from L21

Summary:

It is noted that given the various rainfall intensity data available from Orange County and the historical data available from NOAA Western U.S. Precipitation Frequency Maps it is hard to decide which data to use. The chart above was developed using Orange County Mean Precipitation for Mountainous Areas when we discovered we can use Figure B3 on page 6 or “Nonmoutainous” area less than elevation 2000. This chart significantly reduces the historical rainfall we chose to use and allows us to look at time of concentration of less than 60 minutes. Give the data listed in Figure B3 and reviewing our Q10 flow rates listed above we feel that the pipe listed would still perform at double the flows listed which eliminates the need to recalculate the chart which would prove nothing more.

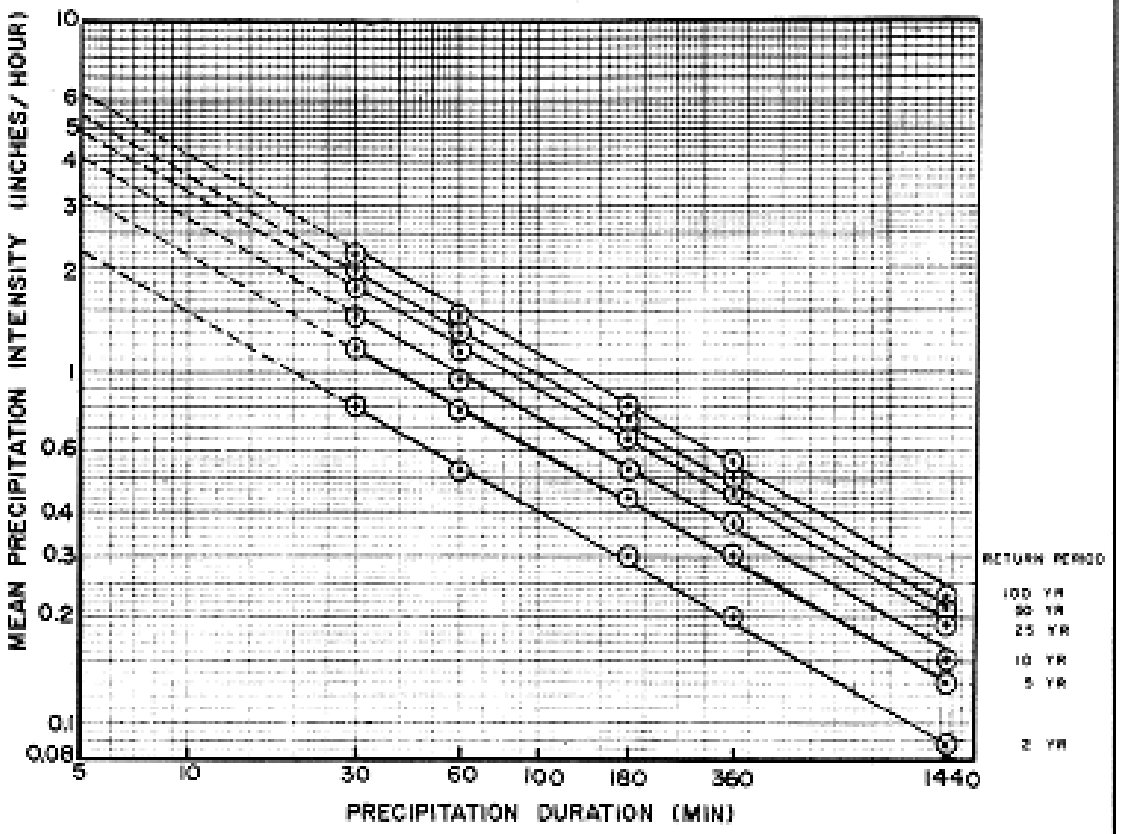
After reviewing all drain lines within the site it is determined that all meet and exceed standard engineering practices for drain line engineering. All lines will convey both Q10 and Q100 storm events. In the event of a

blockage to a drainage inlet over land release will follow the natural and manmade drainage courses ultimately ending up in Aliso Creek confined within the property limits.

Regression Equations: $I(t) = at^b$

(I= Intensity in inches/hour, t= duration in minutes)

Return Frequency (years)	a	b
2	5.702	-0.574
5	7.870	-0.562
10	10.209	-0.573
25	11.995	-0.566
50	13.521	-0.566
100	15.560	-0.573

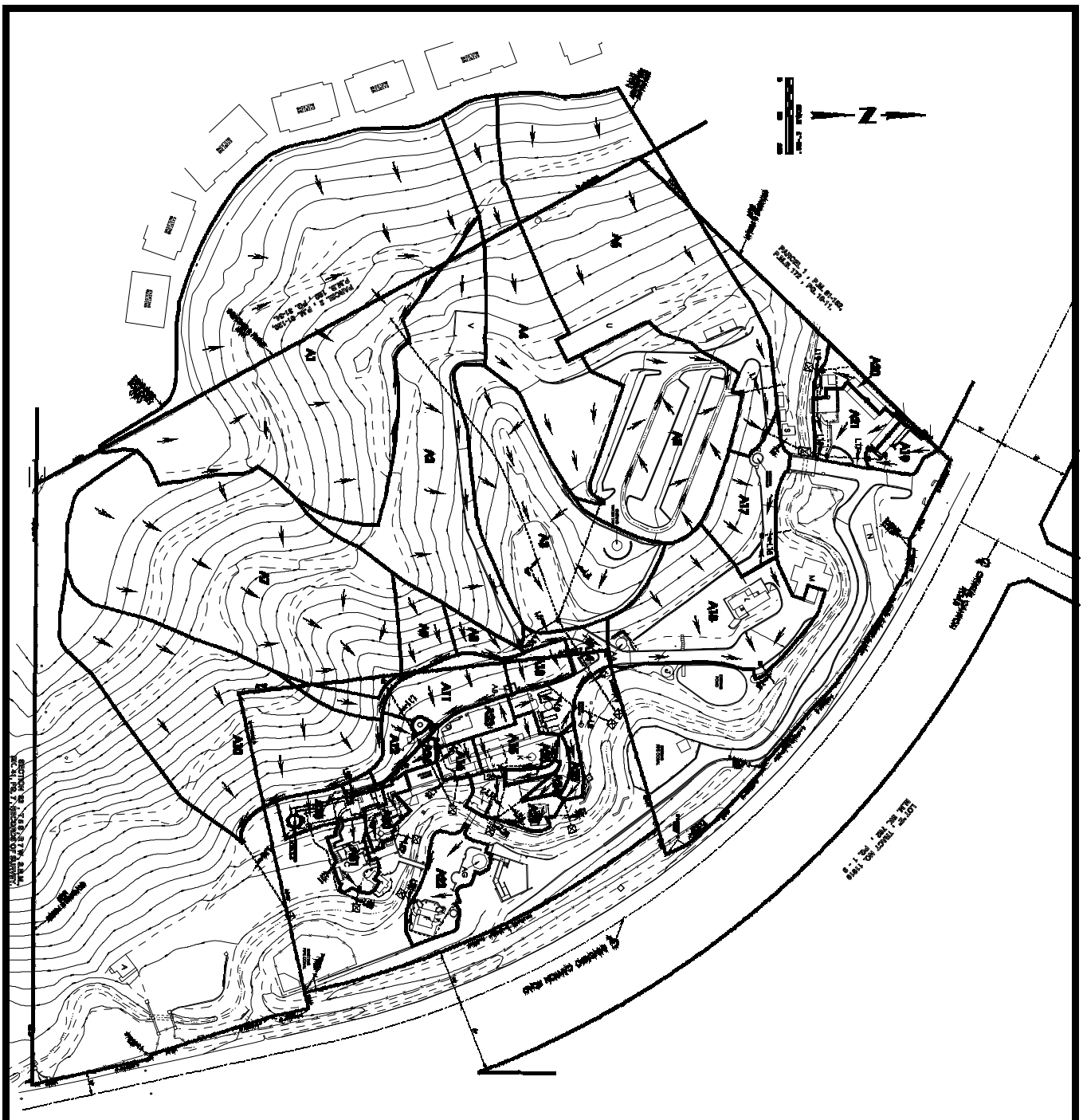


ORANGE COUNTY
HYDROLOGY MANUAL

MEAN PRECIPITATION INTENSITIES FOR NONMOUNTAINOUS AREAS

B-7

Figure B-3



HYDROLOGY MAP
(ONSITE)

JEANNIE LAWRENCE
19191 LAWRENCE CANYON
STAR ROUTE BOX 1038
SILVERADO, CA. 92661

Site Plan & Drainage System Engineering Exhibits:

1. See Hydrology Map (ONSITE) attached 50 scale map for drain line and drainage area delineation. Scale 1”=50’.

End of Report

Hydrology Report
& Flood Plain Calculations

19191 Lawrence Canyon
Orange County, California 92667

TRI THIS ENGINEERING

2214 NEWPORT BLVD. (STE. A)
COSTA MESA, CA 92627
(714) 642-7442

Prepared for:

Greg Cook RCE
P.O. Box 624483
South Lake Tahoe, CA 96154
Phone: 530-544-7774

Prepared by:

David W. Snead - Hydrologist
20294 Hickory Hill Way
Saratoga, CA 95070-4335
Phone: 877-483-2177
Fax: 408-904-4634
Email: David@DWSnead.com

5-27-02

May 27, 2002

Introduction

The project, Rancho las Lomas (RLL), consisting of approximately 20 acres is located directly west of and adjacent to Santiago Canyon road about 1000 feet northerly of the junction of Santiago Canyon Road and Live Oak Canyon Road in Orange County, California. It is traversed from north to south by Santiago Canyon Road and by Alisos Creek, which meanders through the project as a natural drainage course in which several culverts and bridges have been constructed for road crossings.

The drainage area consists of 678.5 acres and varies from elevation 2200 at the north end and to elevation 1111 at the south end as shown on the El Toro and Santiago Peak U.S.G.S.

Quadrangle Maps used in the report update (see Drainage Area Map 'A' & Drainage Area Concentration Point Map 'B' on page 4). At present, the drainage area has undergone residential development to the east modifying its natural state, which consisted of chaparral, open brush, and some live oak trees. This new development has modified the flow characteristics to 2 drainage structures crossing Santiago Canyon Road from the east and discharging into Alisos Creek, which flows north to south through RLL.

The purpose and intent of this report is to further analyze the data from the Carlat report and present the results due to modifications and improvements to the Alisos Creek section running through the RLL site. The flow database used in this report was calculated and updated over a 10 year period by Carlat Engineering and is considered current and a part of this report. The modifications presented herein were to provide control and containment that is more positive in a Q_{100} storm event. We have developed a database for computer analysis of the entire flow line of Alisos Creek through the project. The 100-year flood limits as discovered in the Carlat Report are indicated on insert Exhibit A. Present modifications result in the 100-year flood plain being contained within the limits of the creek bed (see attached "Exhibit - A").

The data and changes presented in this report were developed based on the previous as-built data for the property. Flow through the site encountered numerous structural modifications which reduce and accelerate velocities in feet per second (fps) causing numerous hydraulic jumps and headwater backup. The system could not keep itself clean and provided numerous locations for silt and debris trapping which further raised the flood water level over time. The computer models cross section utilized 1:1 side banks with a flat bottom for the main creek flow line. Modified concrete culverts similar to the sketch section that follows are used for all the crossings except the pedestrian bridge to the restrooms. Grades at various nodes have been modified to return the creek bed to it's original gradient to allow for more consistent and balanced flow in fps thus eliminating numerous hydraulic jumps which occurred at locations of high flow rates converging with relatively flat & slow sections. The computer model section was developed to offer a basis for study of velocities and area required to maintain a fixed volume of water through these sections at a fixed velocity. The creeks cross sections have been modified with more relaxed side slopes as conditions allow along the flow line. This has a negligible effect on the coefficient of friction within the sections length. It is the volume of water and the velocities that it is traveling that are the constants and have been be adhered to in the final engineering documents for the proposed one hundred year flood limits to be achieved.

Reference Materials

Hydrology/Hydrodynamic Assumptions & Criteria are based on the following reference materials:

1) "Orange County Hydrology Manual" Dated March 12, 1991.

2) Orange County E.M.A. "Drainage Design Criteria Aids" dated February 1982.

3) "Hydrology and Flood Plain Calculations for 19191 Lawrence Canyon - Orange County, California 92667" prepared by Carlat Engineering 3812 E. La Palma Avenue - Anaheim, CA 92807 dated November 15, 1989 and revised November 30, 1992. The following data/tables are included in this report for clarity and historical reference only:

   a) Hydrology Criteria
   b) Calculation of Area-weighted Pervious Area Fraction
   c) Watershed Information Form (Figure E-5).
   d) Area - Averaged Mass Rainfall Plotting Sheet for entire watershed - 100-year 24 hour storm adjusted by area weighting for mountainous portion and for depth - area. (Figure B-7)

e) Mean Precipitation Depths for Non-Mountainous Areas (Figure B-1)
f) Mean Precipitation Depths for Mountainous Area (Figure B-2)
g) Mean Precipitation Intensities for Non-Mountainous Areas (Figure B-3)
h) Mean Precipitation Intensities for Mountainous Areas (Figure B-4)
i) Time of Concentration Nomograph for Initial Subarea (figure D-1).
j) Velocity - Discharge - Slope - Relationships, Natural Valley Channels (Plate D-6.1).
k) Slope Adjustment Curve for Natural Mountain Channel (Plate D-6.2).
l) Velocity - Discharge - Slope - Relationships, Natural Mountain Channels (Plate D-6.3)
m) Rational Study Method Form (Figure D-4) 100-year storm rational method study.

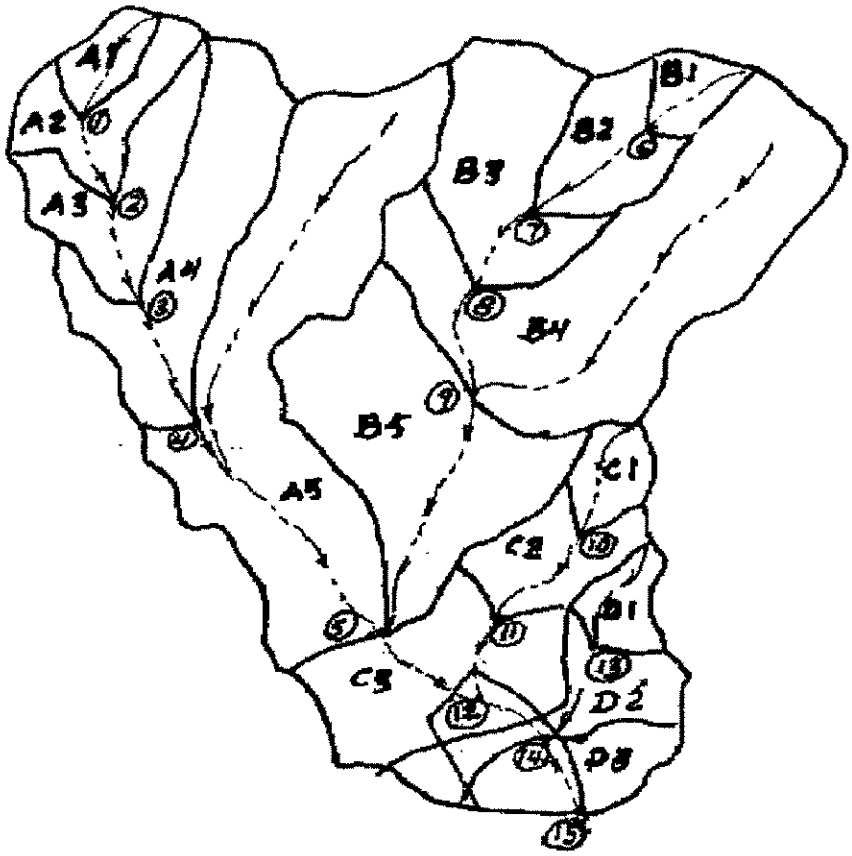
4) Water Surface Profile Listing

5) Hydrology & Flood Plain Delineation - Exhibit A - 100-year Flood Containment Plan.

Observations, Conclusions and Recommendations

Please reference "Hydrology - Exhibit A - Q100 Flood Limits" (attached). All cross sectional dimensions are indicated on the following "Water Surface Profile Listing" (Note: depths listed in the calculations are hypothetical. Water surface elevations are critical):

DRAINAGE AREA MAP 'A'



DRAINAGE AREA CONCENTRATION POINT MAP 'B'

May 6, 2002 9:26:14

WATER SURFACE PROFILE LISTING
Rancho Las Lomas - Q100 Flood Plain Analysis
Created: May 2002
Greg Cook RCE - Dave Snead Hydrologist

0 STATION / ZL NO AVBPR	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD.EL.	SUPER ELEV	CRITICAL DEPTH	HGT/ DIA	BASE/ ID NO.
PIER 0 L/ELEM ZR	SO					SF AVE	HF		NORM DEPTH		
Node 1 -SYSTEM OUTLET											
0 0.00	1111.80	6.62	1118.42	1752.0	15.29	3.63	1122.05	0.00	7.19	7.00	14.00
0.50 0	0.00										
0 0.00	1111.80	6.62	1118.42	1752.0	15.29	3.63	1122.05	0.00	7.19	7.00	14.00
0.50 0	0.00										
0 10.84	0.03440					0.03388	0.37		6.60		
10.84	1112.17	6.64	1118.81	1752.0	15.24	3.61	1122.42	0.00	7.19	7.00	14.00
0.50 0	0.00										
0 21.19	0.03440					0.03165	0.67		6.60		
0.50											
0 32.03	1112.90	6.91	1119.81	1752.0	14.53	3.28	1123.09	0.00	7.19	7.00	14.00
0.50 0	0.00										
0 2.85	0.03440					0.02776	0.08		6.60		
0.50											

```
Node 2
0TRANS STR  0.00000                                    0.02594     0.00
0.50
0     34.88  1113.00     7.19   1120.19    1752.0    13.86      2.98   1123.17   0.92      7.19              7.00    14.00
0.50    0    0.00
0      5.89  0.02420                                    0.02507     0.15                          7.34
0.50
0     40.77  1113.14     7.34   1120.48    1752.0    13.51      2.84   1123.32   0.88      7.19              7.00    14.00
0.50    0    0.00
0     35.43  0.02420                                    0.02421     0.86                          7.34
0.50
0     76.20  1114.00     7.34   1121.34    1752.0    13.51      2.84   1124.18   0.00      7.19              7.00    14.00
0.50    0    0.00
Node 3
0TRANS STR  0.00000                                    0.01547     0.00
0.50
0     76.20  1114.00     9.27   1123.27    1752.0     8.35      1.08   1124.35   1.76      6.26              6.00    18.00
0.50    0    0.00
0     12.69  0.02704                                    0.00720     0.09                          6.05
0.50
0     88.89  1114.34     8.91   1123.25    1752.0     8.76      1.19   1124.44   1.91      6.26              6.00    18.00
0.50    0    0.00
0     12.15  0.02704                                    0.00820     0.10                          6.05
0.50
0    101.04  1114.67     8.56   1123.23    1752.0     9.19      1.31   1124.54   2.07      6.26              6.00    18.00
0.50    0    0.00
0     11.59  0.02704                                    0.00936     0.11                          6.05
0.50
0    112.64  1114.99     8.22   1123.21    1752.0     9.64      1.44   1124.65   2.25      6.26              6.00    18.00
0.50    0    0.00
0     11.02  0.02704                                    0.01067     0.12                          6.05
0.50
0    123.65  1115.28     7.90   1123.18    1752.0    10.11      1.59   1124.77   2.44      6.26              6.00    18.00
0.50    0    0.00
0     10.41  0.02704                                    0.01218     0.13                          6.05
0.50
0    134.06  1115.56     7.58   1123.15    1752.0    10.60      1.75   1124.90   2.66      6.26              6.00    18.00
0.50    0    0.00
0      9.73  0.02704                                    0.01391     0.14                          6.05
0.50
0    143.79  1115.83     7.28   1123.11    1752.0    11.12      1.92   1125.03   2.89      6.26              6.00    18.00
0.50    0    0.00
0      6.37  0.02704                                    0.01556     0.10                          6.05
0.50
0    150.16  1116.00     7.08   1123.08    1752.0    11.50      2.05   1125.13   0.00      6.26              6.00    18.00
0.50    0    0.00
Node 4
0TRANS STR  0.00000                                    0.01398     0.00
0.50
0    150.16  1116.00     7.57   1123.57    1752.0    10.15      1.60   1125.17   0.00      6.07              6.00    19.00
0.50    0    0.00
0      3.10  0.05147                                    0.01235     0.04                          4.79
0.50
0    153.26  1116.16     7.32   1123.48    1752.0    10.56      1.73   1125.21   0.00      6.07              6.00    19.00
0.50    0    0.00
0HYDRAULIC JUMP
0.50
0    153.26  1116.16     4.96   1121.12    1752.0    16.45      4.21   1125.32   0.00      6.07              6.00    19.00
0.50    0    0.00
0     19.55  0.05147                                    0.04330     0.85                          4.79
0.50
0    172.81  1117.17     5.16   1122.32    1752.0    15.75      3.85   1126.18   0.00      6.07              6.00    19.00
0.50    0    0.00
0      9.39  0.05147                                    0.03797     0.36                          4.79
0.50
0    182.20  1117.65     5.38   1123.03    1752.0    15.02      3.50   1126.53   0.00      6.07              6.00    19.00
0.50    0    0.00
0      4.69  0.05147                                    0.03311     0.16                          4.79
0.50
0    186.89  1117.89     5.61   1123.50    1752.0    14.32      3.19   1126.69   0.00      6.07              6.00    19.00
0.50    0    0.00
0      2.13  0.05147                                    0.02888     0.06                          4.79
0.50
0    189.02  1118.00     5.85   1123.85    1752.0    13.65      2.90   1126.75   0.00      6.07              6.00    19.00
0.50    0    0.00
Node 5
0TRANS STR  0.00000                                    0.03354     0.00
0.50
0    189.02  1118.00     5.47   1123.47    1752.0    14.74      3.38   1126.85   1.11      6.07              6.50    19.00
0.50    0    0.00
0      1.19  0.02041                                    0.03394     0.04                          6.38
0.50
0    190.21  1118.02     5.43   1123.45    1752.0    14.86      3.43   1126.89   1.13      6.07              6.50    19.00
0.50    0    0.00
0      7.15  0.02041                                    0.03687     0.26                          6.38
0.50
```

```
0   197.36  1118.17     5.20   1123.37    1752.0    15.59     3.78   1127.15   1.23      6.07              6.50    19.00
0.50    0    0.00
0      7.34  0.02041                                          0.04229     0.31                      6.38
0.50
0   204.70  1118.32     4.99   1123.31    1752.0    16.35     4.15   1127.46   0.00      6.07              6.50    19.00
0.50    0    0.00
Node 6 Bridge Outlet
0   TRANS STR  0.00000                                       0.04149     0.00
0   204.70  1118.32     5.46   1123.78    1752.0    15.48     3.72   1127.50   0.00      6.26              7.50    18.00
0.50    0    0.00
0      5.92  0.01691                                          0.01145     0.07                      4.86
0.50
0   210.62  1118.42     5.52   1123.94    1752.0    15.28     3.63   1127.57   0.00      6.26              7.50    18.00
0.50    0    0.00
0     14.62  0.01691                                          0.01052     0.15                      4.86
0.50
0   225.24  1118.67     5.76   1124.43    1752.0    14.57     3.30   1127.73   0.00      6.26              7.50    18.00
0.50    0    0.00
0      7.03  0.01691                                          0.00919     0.06                      4.86
0.50
0   232.28  1118.79     6.00   1124.79    1752.0    13.89     3.00   1127.79   0.00      6.26              7.50    18.00
0.50    0    0.00
0      1.99  0.01691                                          0.00803     0.02                      4.86
0.50
0   234.27  1118.82     6.26   1125.08    1752.0    13.25     2.73   1127.81   0.00      6.26              7.50    18.00
0.50    0    0.00
Node 7 Bridge Inlet
OTRANS STR  0.00000                                          0.01953     0.00
0.50
0   234.27  1118.82     7.16   1125.98    1752.0    11.08     1.91   1127.89   0.00      6.16              8.00    18.50
0.50    0    0.00
0     43.51  0.01333                                          0.01442     0.63                      7.39
0.50
0   277.78  1119.40     7.28   1126.68    1752.0    10.87     1.84   1128.52   0.00      6.16              8.00    18.50
0.50    0    0.00
Node 8
OTRANS STR  0.00000                                          0.01305     0.00
0.50
0   277.78  1119.40     7.49   1126.89    1752.0    10.28     1.64   1128.54   3.75      6.07              8.00    19.00
0.50    0    0.00
0      8.88  0.02837                                          0.01294     0.11                      5.76
0.50
0   286.66  1119.65     7.19   1126.84    1752.0    10.78     1.81   1128.65   4.08      6.07              8.00    19.00
0.50    0    0.00
0      8.09  0.02837                                          0.01479     0.12                      5.76
0.50
0   294.74  1119.88     6.90   1126.78    1752.0    11.31     1.99   1128.77   4.44      6.07              8.00    19.00
0.50    0    0.00
0      4.19  0.02837                                          0.01640     0.07                      5.76
0.50
0   298.93  1120.00     6.74   1126.74    1752.0    11.62     2.10   1128.84   0.00      6.07              8.00    19.00
0.50    0    0.00
Node 9
OTRANS STR  0.00000                                          0.01011     0.00
0.50
0   298.93  1120.00     8.42   1128.42    1752.0     6.09     0.58   1128.99   0.10      4.61              8.00    30.00
0.50    0    0.00
0      6.07  0.05168                                          0.00342     0.02                      3.55
0.50
0   305.00  1120.31     8.07   1128.38    1752.0     6.38     0.63   1129.01   0.11      4.61              8.00    30.00
0.50    0    0.00
0      5.73  0.05168                                          0.00393     0.02                      3.55
0.50
0   310.73  1120.61     7.73   1128.34    1752.0     6.69     0.70   1129.03   0.12      4.61              8.00    30.00
0.50    0    0.00
0      5.40  0.05168                                          0.00451     0.02                      3.55
0.50
0   316.13  1120.89     7.40   1128.29    1752.0     7.02     0.77   1129.06   0.14      4.61              8.00    30.00
0.50    0    0.00
0      2.15  0.05168                                          0.00496     0.01                      3.55
0.50
0   318.28  1121.00     7.27   1128.27    1752.0     7.16     0.80   1129.07   0.14      4.61              8.00    30.00
0.50    0    0.00
0      0.00  0.05168                                          0.00511     0.00                      3.55
0.50
0   318.28  1121.00     7.27   1128.27    1752.0     7.16     0.80   1129.07   0.00      4.61              8.00    30.00
0.50    0    0.00
   10 - 48" CMP from off-site
   CT STR  0.00000                                           0.00487     0.00
0.50
0   318.28  1121.00     7.37   1128.37    1708.0     6.88     0.73   1129.11   1.96      4.53              8.00    30.00
0.50    0    0.00
0     11.50  0.02561                                          0.00499     0.06                      4.34
0.50
0   329.78  1121.29     7.06   1128.36    1708.0     7.21     0.81   1129.17   2.13      4.53              8.00    30.00
```

```
0.50    0   0.00
0     10.96  0.02561                                    0.00573     0.06                    4.34
0.50
0    340.73  1121.57     6.76   1128.34   1708.0    7.56     0.89   1129.23   2.33     4.53            8.00   30.00
0.50    0   0.00
0      6.29  0.02561                                    0.00639     0.04                    4.34
0.50
0    347.02  1121.74     6.59   1128.33   1708.0    7.78     0.94   1129.27   2.45     4.53            8.00   30.00
0.50    0   0.00
0HYDRAULIC JUMP
0.50
0    347.02  1121.74     2.94   1124.68   1708.0   18.45     5.29   1129.97  12.42     4.53            8.00   30.00
0.50    0   0.00
0      5.07  0.02561                                    0.09695     0.49                    4.34
0.50
0    352.10  1121.87     2.82   1124.69   1708.0   19.26     5.76   1130.45  13.48     4.53            8.00   30.00
0.50    0   0.00
0      5.23  0.02561                                    0.11170     0.58                    4.34
0.50
0    357.33  1122.00     2.70   1124.70   1708.0   20.20     6.34   1131.04   0.00     4.53            8.00   30.00
0.50    0   0.00
Node 11
0TRANS STR  0.00000                                    0.07249     0.00
0.50
0    357.33  1122.00     6.58   1128.58   1708.0   13.45     2.81   1131.39   1.66     6.58            8.00   16.00
0.50    0   0.00
0      1.78  0.01364                                    0.02344     0.04                    7.92
0.50
0    359.11  1122.02     6.86   1128.88   1708.0   12.82     2.55   1131.44   1.53     6.58            8.00   16.00
0.50    0   0.00
0      7.33  0.01364                                    0.02053     0.15                    7.92
0.50
0    366.44  1122.12     7.14   1129.26   1708.0   12.22     2.32   1131.59   1.40     6.58            8.00   16.00
0.50    0   0.00
0     18.80  0.01364                                    0.01799     0.34                    7.92
0.50
0    385.24  1122.38     7.43   1129.81   1708.0   11.66     2.11   1131.92   1.29     6.58            8.00   16.00
0.50    0   0.00
0     13.14  0.01364                                    0.01642     0.22                    7.92
0.50
0    398.38  1122.56     7.54   1130.10   1708.0   11.46     2.04   1132.14   0.00     6.58            8.00   16.00
0.50    0   0.00
N     12
(    NS STR  0.00000                                    0.01603     0.00
0.50
0    398.38  1122.56     7.54   1130.10   1708.0   11.46     2.04   1132.14   0.30     6.58            8.00   16.00
0.50    0   0.00
0     97.77  0.01473                                    0.01543     1.51                    7.74
0.50
0    496.15  1124.00     7.72   1131.72   1708.0   11.14     1.93   1133.65   0.00     6.58            8.00   16.00
0.50    0   0.00
Node 13
0TRANS STR  0.00000                                    0.00929     0.00
0.50
0    496.15  1124.00     9.10   1133.10   1708.0    6.57     0.67   1133.78   0.66     5.20            8.00   24.00
0.50    0   0.00
0     14.33  0.02498                                    0.00402     0.06                    5.06
0.50
0    510.48  1124.36     8.74   1133.09   1708.0    6.89     0.74   1133.83   0.71     5.20            8.00   24.00
0.50    0   0.00
0     13.76  0.02498                                    0.00459     0.06                    5.06
0.50
0    524.23  1124.70     8.38   1133.08   1708.0    7.23     0.81   1133.90   0.78     5.20            8.00   24.00
0.50    0   0.00
0     13.19  0.02498                                    0.00525     0.07                    5.06
0.50
0    537.43  1125.03     8.04   1133.07   1708.0    7.58     0.89   1133.97   0.85     5.20            8.00   24.00
0.50    0   0.00
0     12.64  0.02498                                    0.00601     0.08                    5.06
0.50
0    550.06  1125.35     7.71   1133.06   1708.0    7.95     0.98   1134.04   0.92     5.20            8.00   24.00
0.50    0   0.00
0     12.08  0.02498                                    0.00689     0.08                    5.06
0.50
0    562.15  1125.65     7.40   1133.04   1708.0    8.34     1.08   1134.12   1.00     5.20            8.00   24.00
0.50    0   0.00
0      6.86  0.02498                                    0.00766     0.05                    5.06
0.50
(    569.01  1125.82     7.21   1133.03   1708.0    8.58     1.14   1134.18   0.00     5.20            8.00   24.00
0.50    0   0.00
Node 14
0TRANS STR  0.00000                                    0.00797     0.00
0.50
0    569.01  1125.82     7.21   1133.03   1708.0    8.58     1.14   1134.18   1.41     5.20            8.00   24.00
0.50    0   0.00
0     42.29  0.00852                                    0.00803     0.34                    7.07
```

```
0.50
0   611.30  1126.18     7.18   1133.36    1708.0     8.62     1.15    1134.52    0.00      5.20              8.00    24.00
0.50    0    0.00
Node 15
0TRANS STR  0.00000
0.50
0   611.30  1126.18     5.74   1131.92    1708.0    14.25     3.16    1135.08    0.00      6.16              8.00    18.00
        0    0.00
N   e 16 Pedestrian Bridge Outlet
0TRANS STR  0.00000                                            0.04793      0.00
0.50
0   674.03  1128.00     5.68   1133.68    1708.0    15.97     3.97    1137.64    0.00      6.58              7.00    16.00
0.50    0    0.00
0   674.03  1128.00     5.68   1133.68    1708.0    15.97     3.97    1137.64    0.00      6.58              7.00    16.00
0.50    0    0.00
0     1.60  0.06136                                            0.01201      0.02                    3.47
0.50
0   675.63  1128.10     5.82   1133.92    1708.0    15.52     3.74    1137.66    0.00      6.58              7.00    16.00
0.50    0    0.00
0     1.88  0.06136                                            0.01080      0.02                    3.47
0.50
0   677.52  1128.21     6.07   1134.28    1708.0    14.79     3.40    1137.68    0.00      6.58              7.00    16.00
0.50    0    0.00
0     1.07  0.06136                                            0.00944      0.01                    3.47
0.50
0   678.58  1128.28     6.32   1134.60    1708.0    14.11     3.09    1137.69    0.00      6.58              7.00    16.00
0.50    0    0.00
0     0.34  0.06136                                            0.00826      0.00                    3.47
0.50
Node 17 Pedestrian Bridge Inlet
0TRANS STR  0.00000                                            0.02499      0.00
0.50
0   678.92  1128.30     6.58   1134.88    1708.0    13.45     2.81    1137.69    0.23      6.58              7.00    16.00
0.50    0    0.00
0     3.88  0.02386                                            0.02442      0.09                    6.68
0.50
0   682.80  1128.39     6.68   1135.07    1708.0    13.23     2.72    1137.79    0.23      6.58              7.00    16.00
0.50    0    0.00
0    67.37  0.02386                                            0.02386      1.61                    6.68
0.50
0   750.17  1130.00     6.68   1136.68    1708.0    13.23     2.72    1139.40    0.00      6.58              7.00    16.00
0.50    0    0.00
N   . 18
    NS STR  0.00000                                            0.02273      0.00
0.50
0   750.17  1130.00     6.88   1136.89    1708.0    12.76     2.53    1139.42    2.82      6.58              7.00    16.00
0.50    0    0.00
0     6.71  0.02019                                            0.02143      0.14                    7.03
0.50
0   756.88  1130.14     6.92   1137.05    1708.0    12.69     2.50    1139.56    2.79      6.58              7.00    16.00
0.50    0    0.00
0HYDRAULIC JUMP
0.50
0   756.88  1130.14     6.25   1136.39    1708.0    14.28     3.17    1139.56    3.43      6.58              7.00    16.00
0.50    0    0.00
0     1.36  0.02019                                            0.02999      0.04                    7.03
0.50
0   758.24  1130.16     6.20   1136.36    1708.0    14.43     3.24    1139.60    3.50      6.58              7.00    16.00
0.50    0    0.00
0     5.96  0.02019                                            0.03261      0.19                    7.03
0.50
0   764.20  1130.28     5.95   1136.23    1708.0    15.13     3.56    1139.79    3.80      6.58              7.00    16.00
0.50    0    0.00
0     6.75  0.02019                                            0.03729      0.25                    7.03
0.50
0   770.95  1130.42     5.71   1136.13    1708.0    15.87     3.92    1140.04    4.14      6.58              7.00    16.00
0.50    0    0.00
0     7.11  0.02019                                            0.04265      0.30                    7.03
0.50
0   778.05  1130.56     5.48   1136.04    1708.0    16.65     4.31    1140.35    4.50      6.58              7.00    16.00
0.50    0    0.00
0     7.24  0.02019                                            0.04881      0.35                    7.03
0.50
0   785.29  1130.71     5.25   1135.96    1708.0    17.46     4.74    1140.70    4.90      6.58              7.00    16.00
0.50    0    0.00
0     7.24  0.02019                                            0.05588      0.40                    7.03
0.50
0   792.54  1130.86     5.04   1135.89    1708.0    18.31     5.21    1141.10    5.34      6.58              7.00    16.00
        0    0.00
0     7.16  0.02019                                            0.06400      0.46                    7.03
0.50
0   799.70  1131.00     4.83   1135.83    1708.0    19.21     5.73    1141.56    0.00      6.58              7.00    16.00
0.50    0    0.00
Node 19  Pedestrian Bridge Outlet
0TRANS STR  0.00000                                            0.05052      0.00
0.50
```

```
0   799.70  1131.00     6.25   1137.25    1708.0   15.08     3.53   1141.78   0.00     7.66            7.00   12.00
0.50    0   0.00
0     5.50  0.03555                                          0.03180     0.17                  7.07
0.50
0   805.20  1131.20     6.37   1137.57    1708.0   14.77     3.39   1141.96   0.00     7.66            7.00   12.00
0.50    0   0.00
0     2.94  0.03555                                          0.02903     0.09                  7.07
0.50
0   808.14  1131.30     6.66   1137.96    1708.0   14.08     3.08   1142.04   0.00     7.66            7.00   12.00
0.50    0   0.00
Node 20 Pedestrian Bridge Inlet
0TRANS STR  0.00000                                          0.01850     0.00
0.50
0   808.14  1131.30     7.47   1138.77    1708.0    9.63     1.44   1142.21   0.00     7.08            7.00   14.00
0.50    0   0.00
0    22.53  0.01984                                          0.01051     0.24                  7.67
0.50
0   830.67  1131.75     7.11   1138.86    1708.0   10.10     1.59   1142.44   0.00     7.08            7.00   14.00
0.50    0   0.00
0    12.75  0.01984                                          0.01160     0.15                  7.67
0.50
0   843.42  1132.00     7.92   1138.92    1708.0   10.37     1.67   1142.59   0.00     7.08            7.00   14.00
0.50    0   0.00
0HYDRAULIC JUMP
0.50
Node 21
0TRANS STR  0.00000                                          0.01201     0.00
0.50
0   850.34  1132.00     5.89   1138.23    1708.0   17.13     4.56   1142.79   1.78     7.08            8.00   14.00
0.50    0   0.00
0    25.94  0.05027                                          0.04573     1.19                  5.78
0.50
0   876.28  1133.65     6.03   1139.68    1708.0   16.66     4.31   1143.99   1.69     7.08            8.00   14.00
0.50    0   0.00
0    15.89  0.05027                                          0.04123     0.65                  5.78
0.50
0   892.17  1134.45     6.28   1140.73    1708.0   15.88     3.92   1144.65   1.56     7.08            8.00   14.00
0.50    0   0.00
0     7.01  0.05027                                          0.03613     0.25                  5.78
0.50
0   899.17  1134.80     6.53   1141.34    1708.0   15.14     3.56   1144.90   1.43     7.08            8.00   14.00
0.50    0   0.00
0     3.09  0.05027                                          0.03168     0.10                  5.78
0.50
0   902.27  1134.96     6.80   1141.76    1708.0   14.44     3.24   1145.00   1.32     7.08            8.00   14.00
0.50    0   0.00
0     0.83  0.05027                                          0.02778     0.02                  5.78
0.50
0   903.10  1135.00     7.08   1142.08    1708.0   13.76     2.94   1145.02   0.00     7.08            8.00   14.00
0.50    0   0.00
Node 22
0TRANS STR  0.00000                                          0.01939     0.00
0.50
0   903.10  1135.00     8.39   1143.39    1708.0   10.60     1.75   1145.14   1.29     6.82            9.00   15.00
0.50    0   0.00
0     9.37  0.02953                                          0.01372     0.13                  6.52
0.50
0   912.47  1135.28     8.07   1143.35    1708.0   11.12     1.92   1145.27   1.39     6.82            9.00   15.00
0.50    0   0.00
0     8.63  0.02953                                          0.01562     0.13                  6.52
0.50
0   921.10  1135.53     7.76   1143.29    1708.0   11.66     2.11   1145.40   1.51     6.82            9.00   15.00
0.50    0   0.00
0     7.70  0.02953                                          0.01780     0.14                  6.52
0.50
0   928.80  1135.76     7.46   1143.22    1708.0   12.23     2.32   1145.54   1.64     6.82            9.00   15.00
0.50    0   0.00
0     6.38  0.02953                                          0.02029     0.13                  6.52
0.50
0   935.18  1135.95     7.17   1143.11    1708.0   12.83     2.56   1145.67   1.78     6.82            9.00   15.00
0.50    0   0.00
0     0.81  0.02953                                          0.02180     0.02                  6.52
0.50
0   935.99  1135.97     7.13   1143.10    1708.0   12.90     2.59   1145.69   1.80     6.82            9.00   15.00
0.50    0   0.00
0HYDRAULIC JUMP
0.50
0   935.99  1135.97     6.52   1142.49    1708.0   14.36     3.20   1145.69   2.17     6.82            9.00   15.00
0.50    0   0.00
0     5.53  0.02953                                          0.02954     0.16                  6.52
0.50
0   941.52  1136.13     6.52   1142.65    1708.0   14.36     3.20   1145.85   2.17     6.82            9.00   15.00
0.50    0   0.00
0    21.19  0.02953                                          0.02930     0.62                  6.52
0.50
0   962.71  1136.76     6.55   1143.31    1708.0   14.27     3.17   1146.47   2.15     6.82            9.00   15.00
```

```
0.50    0    0.00
0       8.12   0.02953                                    0.02726      0.22                    6.52
0.50
0    970.83  1137.00      6.82   1143.82    1708.0   13.61      2.88   1146.70    0.00      6.82              9.00    15.00
0.50    0    0.00
Node 23
TRANS STR   0.00000                                    0.01910      0.00
0
     970.83  1137.00      8.08   1145.08    1708.0   10.54      1.73   1146.81    0.10      6.58              8.00    16.00
0.50    0    0.00
0      17.19   0.02193                                    0.01364      0.23                    6.85
0.50
0    988.02  1137.38      7.77   1145.15    1708.0   11.06      1.90   1147.05    0.10      6.58              8.00    16.00
0.50    0    0.00
0      17.95   0.02193                                    0.01555      0.28                    6.85
0.50
0   1005.97  1137.77      7.46   1145.23    1708.0   11.60      2.09   1147.32    0.11      6.58              8.00    16.00
0.50    0    0.00
0      10.47   0.02193                                    0.01718      0.18                    6.85
0.50
0   1016.44  1138.00      7.30   1145.30    1708.0   11.90      2.20   1147.50    0.12      6.58              8.00    16.00
0.50    0    0.00
0       0.00   0.02193                                    0.01779      0.00                    6.85
0.50
0   1016.44  1138.00      7.30   1145.30    1708.0   11.90      2.20   1147.50    0.00      6.58              8.00    16.00
0.50    0    0.00
Node 24
0JUNCT STR   0.00000                                    0.01523      0.00
0.50
0   1016.44  1138.00      7.94   1145.94    1653.0   10.42      1.69   1147.63    1.95      6.45              8.00    16.00
0.50    0    0.00
0      11.42   0.02593                                    0.01355      0.15                    6.38
0.50
0   1027.86  1138.30      7.63   1145.93    1653.0   10.93      1.86   1147.78    2.11      6.45              8.00    16.00
0.50    0    0.00
0      10.87   0.02593                                    0.01545      0.17                    6.38
0.50
0   1038.73  1138.58      7.33   1145.91    1653.0   11.47      2.04   1147.95    2.29      6.45              8.00    16.00
0.50    0    0.00
0      10.24   0.02593                                    0.01763      0.18                    6.38
0.50
0   1048.97  1138.84      7.04   1145.89    1653.0   12.03      2.25   1148.13    2.49      6.45              8.00    16.00
0.50    0    0.00
       9.39   0.02593                                    0.02012      0.19                    6.38
0.50
0   1058.36  1139.09      6.76   1145.85    1653.0   12.61      2.47   1148.32    2.71      6.45              8.00    16.00
0.50    0    0.00
0       7.29   0.02593                                    0.02281      0.17                    6.38
0.50
0   1065.65  1139.28      6.52   1145.80    1653.0   13.16      2.69   1148.49    2.92      6.45              8.00    16.00
0.50    0    0.00
0HYDRAULIC JUMP
0.50
0   1065.65  1139.28      6.38   1145.66    1653.0   13.50      2.83   1148.49    3.05      6.45              8.00    16.00
0.50    0    0.00
0      25.17   0.02593                                    0.02594      0.65                    6.38
0.50
0   1090.83  1139.93      6.38   1146.31    1653.0   13.50      2.83   1149.14    3.05      6.45              8.00    16.00
0.50    0    0.00
0       2.73   0.02593                                    0.02548      0.07                    6.38
0.50
Node 25
0TRANS STR   0.00000                                    0.02502      0.00
0.50
0   1093.56  1140.00      6.45   1146.45    1653.0   13.33      2.76   1149.21    2.33      6.45             10.00    16.00
0.50    0    0.00
0       1.42   0.01148                                    0.02346      0.03                    8.18
0.50
0   1094.98  1140.02      6.72   1146.74    1653.0   12.71      2.51   1149.24    2.14      6.45             10.00    16.00
0.50    0    0.00
0       5.47   0.01148                                    0.02055      0.11                    8.18
0.50
0   1100.46  1140.08      7.00   1147.08    1653.0   12.12      2.28   1149.36    1.97      6.45             10.00    16.00
0.50    0    0.00
0      12.32   0.01148                                    0.01800      0.22                    8.18
0.50
0   1112.78  1140.22      7.28   1147.51    1653.0   11.55      2.07   1149.58    1.81      6.45             10.00    16.00
0.50    0    0.00
       25.47   0.01148                                    0.01578      0.40                    8.18

0   1138.25  1140.51      7.58   1148.10    1653.0   11.01      1.89   1149.98    1.67      6.45             10.00    16.00
0.50    0    0.00
0      15.47   0.01148                                    0.01445      0.22                    8.18
0.50
0   1153.72  1140.69      7.68   1148.37    1653.0   10.86      1.83   1150.20    1.63      6.45             10.00    16.00
0.50    0    0.00
```

```
OHYDRAULIC JUMP
0.50
0  1153.72  1140.69     5.35   1146.04   1653.0   16.55     4.26   1150.30   3.42     6.45            10.00   16.00
0.50    0    0.00
0      3.65  0.01148                                        0.04813     0.18                 8.18
0.50
0  1157.37  1140.73     5.20   1145.94   1653.0   17.07     4.53   1150.47   3.61     6.45            10.00   16.00
0.50    0    0.00
0      5.65  0.01148                                        0.05391     0.30                 8.18
0.50
0  1163.02  1140.80     4.99   1145.79   1653.0   17.91     4.98   1150.77   3.93     6.45            10.00   16.00
0.50    0    0.00
0      5.82  0.01148                                        0.06175     0.36                 8.18
0.50
0  1168.84  1140.86     4.79   1145.65   1653.0   18.78     5.48   1151.13   4.28     6.45            10.00   16.00
0.50    0    0.00
0      5.91  0.01148                                        0.07077     0.42                 8.18
0.50
0  1174.75  1140.93     4.59   1145.52   1653.0   19.70     6.03   1151.55   4.67     6.45            10.00   16.00
0.50    0    0.00
0      5.92  0.01148                                        0.08115     0.48                 8.18
0.50
0  1180.67  1141.00     4.40   1145.40   1653.0   20.66     6.63   1152.03   0.00     6.45            10.00   16.00
0.50    0    0.00
Node 26
0TRANS STR  0.00000                                        0.05772     0.00
0.50
0  1180.67  1141.00     8.20   1149.20   1653.0   14.29     3.18   1152.38   2.63     8.20            11.00   10.00
0.50    0    0.00
0      2.24  0.01863                                        0.02702     0.06                 9.29
0.50
0  1182.91  1141.04     8.51   1149.55   1653.0   13.63     2.89   1152.44   2.43     8.20            11.00   10.00
0.50    0    0.00
0     10.56  0.01863                                        0.02381     0.25                 9.29
0.50
0  1193.48  1141.24     8.83   1150.06   1653.0   13.00     2.62   1152.69   2.25     8.20            11.00   10.00
0.50    0    0.00
0     37.66  0.01863                                        0.02098     0.79                 9.29
0.50
0  1231.14  1141.94     9.15   1151.09   1653.0   12.39     2.39   1153.48   2.08     8.20            11.00   10.00
0.50    0    0.00
0      3.21  0.01863                                        0.01961     0.06                 9.29
0.50
0  1234.35  1142.00     9.16   1151.16   1653.0   12.37     2.38   1153.54   2.07     8.20            11.00   10.00
0.50    0    0.00
0      0.00  0.01863                                        0.01958     0.00                 9.29
0.50
0  1234.35  1142.00     9.16   1151.16   1653.0   12.37     2.38   1153.54   0.00     8.20            11.00   10.00
0.50    0    0.00
Node 27
0TRANS STR  0.00000                                        0.01957     0.00
0.50
0  1234.35  1142.00     9.16   1151.16   1653.0   12.37     2.38   1153.54   0.00     8.20            12.00   10.00
0.50    0    0.00
0     22.33  0.01299                                        0.01841     0.41                10.30
0.50
0  1256.68  1142.29     9.50   1151.79   1653.0   11.80     2.16   1153.95   0.00     8.20            12.00   10.00
0.50    0    0.00
0     46.62  0.01299                                        0.01623     0.76                10.30
0.50
0  1303.30  1142.90     9.85   1152.74   1653.0   11.25     1.97   1154.71   0.00     8.20            12.00   10.00
0.50    0    0.00
0      8.04  0.01299                                        0.01511     0.12                10.30
0.50
0  1311.34  1143.00     9.88   1152.88   1653.0   11.19     1.95   1154.83   0.00     8.20            12.00   10.00
0.50    0    0.00
Node 28
0TRANS STR  0.00000                                        0.00902     0.00
0.50
0  1311.34  1143.00    11.38   1154.38   1653.0    6.13     0.58   1154.97   0.92     6.04            10.00   18.00
0.50    0    0.00
0      5.02  0.07736                                        0.00323     0.02                 4.22
0.50
0  1316.36  1143.39    10.95   1154.34   1653.0    6.43     0.64   1154.98   1.00     6.04            10.00   18.00
0.50    0    0.00
0      4.78  0.07736                                        0.00367     0.02                 4.22
0.50
0  1321.14  1143.76    10.54   1154.30   1653.0    6.74     0.71   1155.00   1.08     6.04            10.00   18.00
0.50    0    0.00
0      4.54  0.07736                                        0.00418     0.02                 4.22
0.50
0  1325.67  1144.11    10.13   1154.24   1653.0    7.07     0.78   1155.02   1.18     6.04            10.00   18.00
0.50    0    0.00
0      4.29  0.07736                                        0.00476     0.02                 4.22
0.50
0  1329.97  1144.44     9.75   1154.19   1653.0    7.42     0.85   1155.04   1.28     6.04            10.00   18.00
```

```
0.50    0    0.00
0      4.04   0.07736                                    0.00542      0.02                    4.22
0.50
0   1334.01   1144.75     9.37   1154.12    1653.0    7.78      0.94   1155.06   1.38      6.04          10.00    18.00
0.50    0    0.00
0      3.79   0.07736                                    0.00618      0.02                    4.22
0.50
0   1337.80   1145.05     9.01   1154.05    1653.0    8.16      1.03   1155.09   1.50      6.04          10.00    18.00
0.50    0    0.00
0      3.53   0.07736                                    0.00704      0.02                    4.22
0.50
0   1341.33   1145.32     8.65   1153.97    1653.0    8.56      1.14   1155.11   1.63      6.04          10.00    18.00
0.50    0    0.00
0      3.26   0.07736                                    0.00803      0.03                    4.22
0.50
0   1344.59   1145.57     8.31   1153.89    1653.0    8.97      1.25   1155.14   1.77      6.04          10.00    18.00
0.50    0    0.00
0      2.97   0.07736                                    0.00916      0.03                    4.22
0.50
0   1347.56   1145.80     7.99   1153.79    1653.0    9.41      1.38   1155.16   1.92      6.04          10.00    18.00
0.50    0    0.00
0      2.56   0.07736                                    0.01042      0.03                    4.22
0.50
0   1350.12   1146.00     7.68   1153.68    1653.0    9.85      1.51   1155.19   2.08      6.04          10.00    18.00
0.50    0    0.00
0      0.00   0.07736                                    0.01108      0.00                    4.22
0.50
0   1350.12   1146.00     7.68   1153.68    1653.0    9.85      1.51   1155.19   0.00      6.04          10.00    18.00
0.50    0    0.00
Node 29 4'x4'RCB from off-site
0JUNCT STR  0.00000                                    0.00905      0.00
0.50
0   1350.12   1146.00     8.37   1154.37    1515.0    8.15      1.03   1155.41   1.70      5.71          10.00    18.00
0.50    0    0.00
0     10.03   0.03011                                    0.00752      0.08                    5.35
0.50
0   1360.15   1146.30     8.04   1154.35    1515.0    8.55      1.14   1155.48   1.84      5.71          10.00    18.00
0.50    0    0.00
0      9.51   0.03011                                    0.00858      0.08                    5.35
0.50
0   1369.66   1146.59     7.73   1154.31    1515.0    8.97      1.25   1155.56   2.00      5.71          10.00    18.00
0.50    0    0.00
0      8.79   0.03011                                    0.00978      0.09                    5.35
0.50
0   1378.45   1146.85     7.42   1154.28    1515.0    9.40      1.37   1155.65   2.17      5.71          10.00    18.00
0.50    0    0.00
0HYDRAULIC JUMP
0.50
0   1378.45   1146.85     4.27   1151.12    1515.0   17.63      4.83   1155.95   6.70      5.71          10.00    18.00
0.50    0    0.00
0      4.88   0.03011                                    0.06501      0.32                    5.35
0.50
0   1383.33   1147.00     4.17   1151.17    1515.0   18.10      5.09   1156.26   0.00      5.71          10.00    18.00
0.50    0    0.00
Node 30
0JUNCT STR  0.00000                                    0.06536      0.00
0.50
0   1383.33   1147.00     4.59   1151.59    1460.0   17.88      4.97   1156.56   0.00      6.08          10.00    15.50
0.50    0    0.00
0     31.34   0.06298                                    0.06300      1.97                    4.59
0.50
0   1414.67   1148.97     4.59   1153.56    1460.0   17.88      4.97   1158.53   0.00      6.08          10.00    15.50
0.50    0    0.00
0     63.62   0.06298                                    0.06376      4.06                    4.59
0.50
0   1478.29   1152.98     4.55   1157.54    1460.0   18.03      5.05   1162.59   0.00      6.08          10.00    15.50
0.50    0    0.00
0     50.57   0.06298                                    0.06924      3.50                    4.59
0.50
0   1528.86   1156.17     4.37   1160.53    1460.0   18.91      5.56   1166.09   0.00      6.08          10.00    15.50
0.50    0    0.00
0     22.78   0.06298                                    0.07941      1.81                    4.59
0.50
0   1551.64   1157.60     4.18   1161.78    1460.0   19.84      6.11   1167.90   0.00      6.08          10.00    15.50
0.50    0    0.00
Node 31
0TRANS STR  0.00000                                    0.05682      0.00
0.50
0   1551.64   1157.60     7.62   1165.22    1460.0   13.86      2.99   1168.21   1.15      7.62           7.00    10.00
0.50    0    0.00
0      1.37   0.01420                                    0.02706      0.04                    9.35
0.50
0   1553.01   1157.62     7.91   1165.53    1460.0   13.22      2.72   1168.25   1.06      7.62           7.00    10.00
0.50    0    0.00
0      5.35   0.01420                                    0.02383      0.13                    9.35
0.50
```

```
0  1558.37  1157.70     8.21   1165.91   1460.0   12.60     2.47   1168.38   0.98     7.62            7.00   10.00
0.50    0   0.00
0     12.29  0.01420                                        0.02099     0.26                  9.35
0.50
0  1570.65  1157.87     8.52   1166.39   1460.0   12.02     2.24   1168.63   0.91     7.62            7.00   10.00
0.50    0   0.00
0     26.44  0.01420                                        0.01849     0.49                  9.35
0.50
 597.09  1158.25     8.84   1167.08   1460.0   11.46     2.04   1169.12   0.84     7.62            7.00   10.00
0.50    0   0.00
0     39.07  0.01420                                        0.01660     0.65                  9.35
0.50
0  1636.16  1158.80     9.06   1167.86   1460.0   11.09     1.91   1169.77   0.00     7.62            7.00   10.00
0.50    0   0.00
Node 32
0JUNCT STR  0.00000                                        0.01129     0.00
0.50
0  1636.16  1158.80    10.33   1169.13   1405.0    6.43     0.64   1169.77   0.32     5.83            7.00   16.00
0.50    0   0.00
0     10.90  0.03392                                        0.00408     0.04                  5.31
0.50
0  1647.06  1159.17     9.94   1169.11   1405.0    6.74     0.71   1169.82   0.34     5.83            7.00   16.00
0.50    0   0.00
0     10.46  0.03392                                        0.00464     0.05                  5.31
0.50
0  1657.52  1159.52     9.57   1169.09   1405.0    7.07     0.78   1169.87   0.37     5.83            7.00   16.00
0.50    0   0.00
0     10.02  0.03392                                        0.00528     0.05                  5.31
0.50
0  1667.53  1159.86     9.20   1169.06   1405.0    7.41     0.85   1169.92   0.41     5.83            7.00   16.00
0.50    0   0.00
0      4.01  0.03392                                        0.00577     0.02                  5.31
0.50
0  1671.54  1160.00     9.05   1169.05   1405.0    7.56     0.89   1169.94   0.00     5.83            7.00   16.00
0.50    0   0.00
Node 33
0TRANS STR  0.00000                                        0.01913     0.00
0.50
0  1671.54  1160.00     9.17   1169.17   1405.0    7.10     0.78   1169.95   1.19     5.63            8.00   17.00
0.50    0   0.00
0      7.69  0.04127                                        0.00538     0.04                  4.81
0.50
0  1679.23  1160.32     8.82   1169.13   1405.0    7.44     0.86   1169.99   1.29     5.63            8.00   17.00
        0   0.00
0      7.29  0.04127                                        0.00613     0.04                  4.81
0.50
0  1686.53  1160.62     8.47   1169.09   1405.0    7.81     0.95   1170.04   1.41     5.63            8.00   17.00
0.50    0   0.00
0      6.89  0.04127                                        0.00699     0.05                  4.81
0.50
0  1693.41  1160.90     8.14   1169.05   1405.0    8.19     1.04   1170.09   1.53     5.63            8.00   17.00
0.50    0   0.00
0      2.36  0.04127                                        0.00762     0.02                  4.81
0.50
0  1695.77  1161.00     8.03   1169.03   1405.0    8.33     1.08   1170.11   1.57     5.63            8.00   17.00
0.50    0   0.00
0      0.00  0.04127                                        0.00780     0.00                  4.81
0.50
0  1695.77  1161.00     8.03   1169.03   1405.0    8.33     1.08   1170.11   0.00     5.63            8.00   17.00
0.50    0   0.00
Node 34
0TRANS STR  0.00000                                        0.01699     0.00
0.50
0  1695.77  1161.00     7.74   1168.74   1405.0    9.62     1.44   1170.18   3.61     6.04            8.00   15.00
0.50    0   0.00
0      9.44  0.02878                                        0.01215     0.11                  5.83
0.50
0  1705.21  1161.27     7.44   1168.71   1405.0   10.09     1.58   1170.29   3.92     6.04            8.00   15.00
0.50    0   0.00
0      7.63  0.02878                                        0.01370     0.10                  5.83
0.50
0  1712.84  1161.49     7.19   1168.68   1405.0   10.51     1.72   1170.40   4.20     6.04            8.00   15.00
0.50    0   0.00
0HYDRAULIC JUMP
0.50
0  1712.84  1161.49     5.01   1166.50   1405.0   16.01     3.99   1170.49   8.80     6.04            8.00   15.00
0.50    0   0.00
0      0.02  0.02878                                        0.04697     0.00                  5.83
 712.87  1161.49     5.01   1166.50   1405.0   16.02     3.99   1170.49   8.80     6.04            8.00   15.00
0.50    0   0.00
0      8.96  0.02878                                        0.05037     0.45                  5.83
0.50
0 1721.83  1161.75     4.81   1166.56   1405.0   16.80     4.38   1170.94   0.00     6.04            8.00   15.00
0.50    0   0.00
Node 35
```

```
OTRANS STR  0.00000                                          0.00711     0.00
0.50
0  1721.83  1161.75     4.31   1166.06   1405.0   17.94     5.00   1171.06   1.41     5.83            8.00   16.00
0.50    0   0.00
0     48.02  0.06768                                        0.06311     3.03                 4.29
0.50
0  1769.85  1165.00     4.46   1169.46   1405.0   17.26     4.63   1174.09   0.00     5.83            8.00   16.00
0.50    0   0.00
   e 36 Bridge Outlet
OTRANS STR  0.00000                                          0.10144     0.00
0.50
0  1769.85  1165.00     4.46   1169.46   1405.0   17.27     4.63   1174.10   0.00     5.83            8.00   16.00
0.50    0   0.00
0     20.12  0.01988                                        0.01825     0.37                 4.36
0.50
0  1789.97  1165.40     4.49   1169.89   1405.0   17.16     4.58   1174.46   0.00     5.83            8.00   16.00
0.50    0   0.00
Node 37 Bridge Inlet
OTRANS STR  0.00000                                          0.05907     0.00
0.50
0  1789.97  1165.40     6.53   1171.93   1405.0   13.23     2.72   1174.65   0.28     6.53            7.00   13.00
0.50    0   0.00
0      7.80  0.02288                                        0.02498     0.19                 6.84
0.50
0  1797.77  1165.58     6.79   1172.37   1405.0   12.61     2.47   1174.84   0.26     6.53            7.00   13.00
0.50    0   0.00
0     23.24  0.02288                                        0.02311     0.54                 6.84
0.50
0  1821.01  1166.11     6.84   1172.95   1405.0   12.52     2.44   1175.38   0.25     6.53            7.00   13.00
0.50    0   0.00
0      9.04  0.02288                                        0.02288     0.21                 6.84
0.50
0  1830.05  1166.32     6.84   1173.15   1405.0   12.52     2.44   1175.59   0.25     6.53            7.00   13.00
0.50    0   0.00
0HYDRAULIC JUMP
0.50
0  1830.05  1166.32     6.23   1172.55   1405.0   13.99     3.04   1175.59   0.31     6.53            7.00   13.00
0.50    0   0.00
0      4.45  0.02288                                        0.03265     0.15                 6.84
0.50
0  1834.50  1166.42     6.05   1172.47   1405.0   14.50     3.27   1175.73   0.33     6.53            7.00   13.00
0.50    0   0.00
0      6.41  0.02288                                        0.03668     0.24                 6.84
0.50
   1840.91  1166.57     5.81   1172.37   1405.0   15.21     3.59   1175.97   0.35     6.53            7.00   13.00
0.50    0   0.00
0      6.82  0.02288                                        0.04186     0.29                 6.84
0.50
0  1847.73  1166.72     5.58   1172.30   1405.0   15.95     3.95   1176.25   0.38     6.53            7.00   13.00
0.50    0   0.00
0      6.96  0.02288                                        0.04779     0.33                 6.84
0.50
0  1854.70  1166.88     5.36   1172.24   1405.0   16.73     4.35   1176.59   0.42     6.53            7.00   13.00
0.50    0   0.00
0      6.96  0.02288                                        0.05458     0.38                 6.84
0.50
0  1861.66  1167.04     5.14   1172.18   1405.0   17.55     4.78   1176.97   0.45     6.53            7.00   13.00
0.50    0   0.00
0      6.89  0.02288                                        0.06236     0.43                 6.84
0.50
0  1868.55  1167.20     4.94   1172.13   1405.0   18.40     5.26   1177.40   0.49     6.53            7.00   13.00
0.50    0   0.00
0      6.76  0.02288                                        0.07128     0.48                 6.84
0.50
0  1875.30  1167.35     4.74   1172.09   1405.0   19.30     5.79   1177.88   0.54     6.53            7.00   13.00
0.50    0   0.00
0      6.60  0.02288                                        0.08151     0.54                 6.84
0.50
0  1881.90  1167.50     4.54   1172.05   1405.0   20.24     6.37   1178.42   0.58     6.53            7.00   13.00
0.50    0   0.00
0      6.42  0.02288                                        0.09326     0.60                 6.84
0.50
0  1888.32  1167.65     4.36   1172.01   1405.0   21.23     7.00   1179.01   0.00     6.53            7.00   13.00
0.50    0   0.00
Node 38
OTRANS STR  0.00000                                          0.06974     0.00
0.50
0  1888.32  1167.65     7.88   1175.53   1405.0   15.65     3.81   1179.34   0.56     7.88            7.00   11.00
0.05    0   0.00
(      1.75  0.02793                                        0.04220     0.07                 9.42
0.05
0  1890.07  1167.70     8.25   1175.95   1405.0   14.92     3.46   1179.41   0.51     7.88            7.00   11.00
0.05    0   0.00
0      7.78  0.02793                                        0.03735     0.29                 9.42
0.05
0  1897.85  1167.92     8.64   1176.55   1405.0   14.23     3.15   1179.70   0.47     7.88            7.00   11.00
```

```
0.05    0    0.00
0     23.20   0.02793                                    0.03308      0.77                    9.42
0.05
0   1921.05   1168.56      9.04    1177.61    1405.0    13.57      2.86    1180.47    0.43      7.88              7.00    11.00
0.05    0    0.00
0     44.24   0.02793                                    0.03001      1.33                    9.42
0.05
0   1965.29   1169.80      9.29    1179.09    1405.0    13.19      2.70    1181.80    0.40      7.88              7.00    11.00
0.05    0    0.00
0      0.00   0.02793                                    0.01447      0.00                    9.42
0.05
0   1965.29   1169.80      9.29    1179.09    1405.0    13.19      2.70    1181.80    0.91      7.88              7.00    11.00
0.05    0    0.00
Node 39 System Headworks
```

Rancho Las Lomas

Watershed / Drainage Area Map

U.S. Geological Survey El Toro & Santiago Peak
Topographic Quadrangle Maps (1967)

Area as noted

North

100 YEAR FLOOD PLAIN CERTIFICATION

AUGUST 5, 2002

COUNTY OF ORANGE (PFRD)
300 N. FLOWER ST.
SANTA ANA, CA. 92703

PROJECT: RANCHO LAS LOMAS
19191 LAWRENCE CANYON
SILVERADO, CA.

THIS LETTER IS TO CERTIFY THAT THE LOWEST FINISH FLOOR ELEVATION (F.F.E.) FOR ALL THE BUILDINGS LISTED BELOW BY BUILOING LETTER AND LOCATED ON THE ABOVE REFERENCED PROJECT ARE AT LEAST ONE FOOT OR GREATER ABOVE THE ADJACENT 100 YEAR FLOOD PLAIN LEVEL SHOWN ON HYDROLOGY REPORT DATED 5-27-02 PREPAREO BY THIS FIRM ANO ATTACHED HERETO AND BY REFERENCE MAOE A PART HEREOF.

BUILDING LETTER	LOWEST FINISH FLOOR ELEVATION	100 YR. WATER SURFACE LEVEL
A	1132.3	1123.4
AB	1156.7	1146.5
AA	1162.5	1149.2
C	1142.2	1133.0
D	1143.4	1134.9
E	1136.5	1133.0
F	1137.8	1133.7
G	1145.5	1143.4
H	1156.9	1146.5
J	1160.5	1151.2
K	1155.5	1146.0
L	1168.3	1165.2

BUILDING LETTER	LOWEST FINISH FLOOR ELEVATION	100 YR. WATER SURFACE LEVEL
N	1176.0	1169.2
P	1176.4	1171.9
Q	1176.6	1175.6
R	1176.5	1175.5
S	1179.1	1175.6
T	1204.5	1175.6
U	1227.7	1175.6
V	1229.1	1175.6
X	1154.9	1134.9
Y	1154.8	1134.9
Z	1163.0	1136.9

THE FOLLOWING LISTEO BUILDINGS LOWEST FINISH FLOOR ELEVATIONS ARE NOT ONE FOOT ABOVE THE ABOVE REFERENCED 100 YR. FLOOD PLAIN LEVEL. THE EFFECT OF FLOODING HAS BEEN MITIGATED BY THE USE OF AN APPROXIMATELY TWO FOOT HIGH FLOOD CONTAINMENT WALL LOCATED ADJACENT TO SAID BUILDINGS. THE TOP OF WALL ELEVATION IS AT LEAST ONE FOOT OR GREATER ABOVE SAID 100 YR. FLOOD PLAIN LEVEL.

BUILDING LETTER	LOWEST FINISH FLOOR ELEVATION	100 YR. WATER SURFACE LEVEL	TOP OF FLOOD CONTAINMENT WALL
AH	1138.6	1138.8	1141.0
AG	1138.3	1138.3	1140.4

PREPARED UNDER THE SUPERVISION OF:

8-5-02

GREGORY J. COOK R.C.E. 31570
EXP. 12-31-04

TRITHIS ENGINEERING 2214 NEWPORT BLVD. (STE.A) COSTA MESA, CA. 92627 (949) 642-7442